DRINKING WATER SURVEILLANCE PROGRAM

WELLAND WATER SUPPLY SYSTEM

ANNUAL REPORT 1990

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WELLAND
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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

WELLAND WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Welland water supply system is a conventional treatment plant which treats water from Lake Erie via the Welland Recreational Canal. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. This plant has a rated capacity of 68 x 1000 m^3/day. The Welland water supply system serves a population of approximately 52,200.

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No health related guidelines were exceeded.

The Welland water supply system, for the year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE

A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW TESTS	SITE RAW POSITIVE	SITE RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE
BACTERIOLOGICAL	36	27	75	12	4	33	12	0	0
CHEMISTRY (FLD)	36	35	97	72	72	100	144	144	100
CHEMISTRY (LAB)	264	219	82	264	203	76	456	386	84
METALS	288	99	34	288	98	34	552	247	44
CHLOROAROMATICS	154	0	0	168	0	0	168	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.
PAH	204	0	0	204	0	0	17	0	0
PESTICIDES & PCB	388	0	0	409	0	0	254	0	0
PHENOLICS	12	1	8	12	2	16	.	.	.
SPECIFIC PESTICIDES	63	0	0	64	0	0	12	0	0
VOLATILES	319	0	0	348	49	14	348	53	15
TOTAL	1776	381		1853	428		1963	830	

DRINKING WATER SURVEILLANCE PROGRAM

WELLAND WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Welland treatment plant in the spring of 1989. A previous annual report was published for 1989.

PLANT DESCRIPTION

The Welland water supply system is a conventional treatment plant which treats water from Lake Erie via the Welland Recreational Canal. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. This plant has a rated capacity of 68 x 1000 m^3/day. The Welland water supply system serves a population of approximately 52,200.

The sample day flows ranged from 27.1 x 1000 m^3/day to 47.3 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since

the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 8 of 24 treated and distributed water samples with a maximum reported value of 23.0°C.

CHEMISTRY (LAB)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 24 of 24 treated and distributed water samples with a maximum reported value of 139.6 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 15 of 24 treated and distributed water samples with a maximum reported value of 280.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatics scan showed that none were detected.

CHLOROPHENOLS

The results of the chlorophenols scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Benzene was found at positive levels in 1 of the 24 treated and distributed water samples analyzed. The maximum observed level was 0.7 ug/L. This was below the ODWO Maximum Acceptable Concentration of 5.0 ug/L.

Toluene was found at positive levels in 3 of the 24 treated and distributed water samples analyzed. The maximum observed level was 1.6 ug/L. This was below the ODWO Aesthetic Objective of 24.0 ug/L.

M-xylene was found at positive levels in 1 of the 24 treated and distributed water samples analyzed. The maximum observed level was 1.3 ug/L. This was below the ODWO Aesthetic Objective of 300.0 ug/L.

O-xylene was found at positive levels in 1 of the 24 treated and distributed water samples analyzed. The maximum observed level was 0.6 ug/L. This was below the ODWO Aesthetic Objective of 300.0 ug/L.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 24 treated and distributed water samples analyzed with a maximum level of 55.3 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Welland water treatment plant, for the sample year of 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

WELLAND WATER SUPPLY

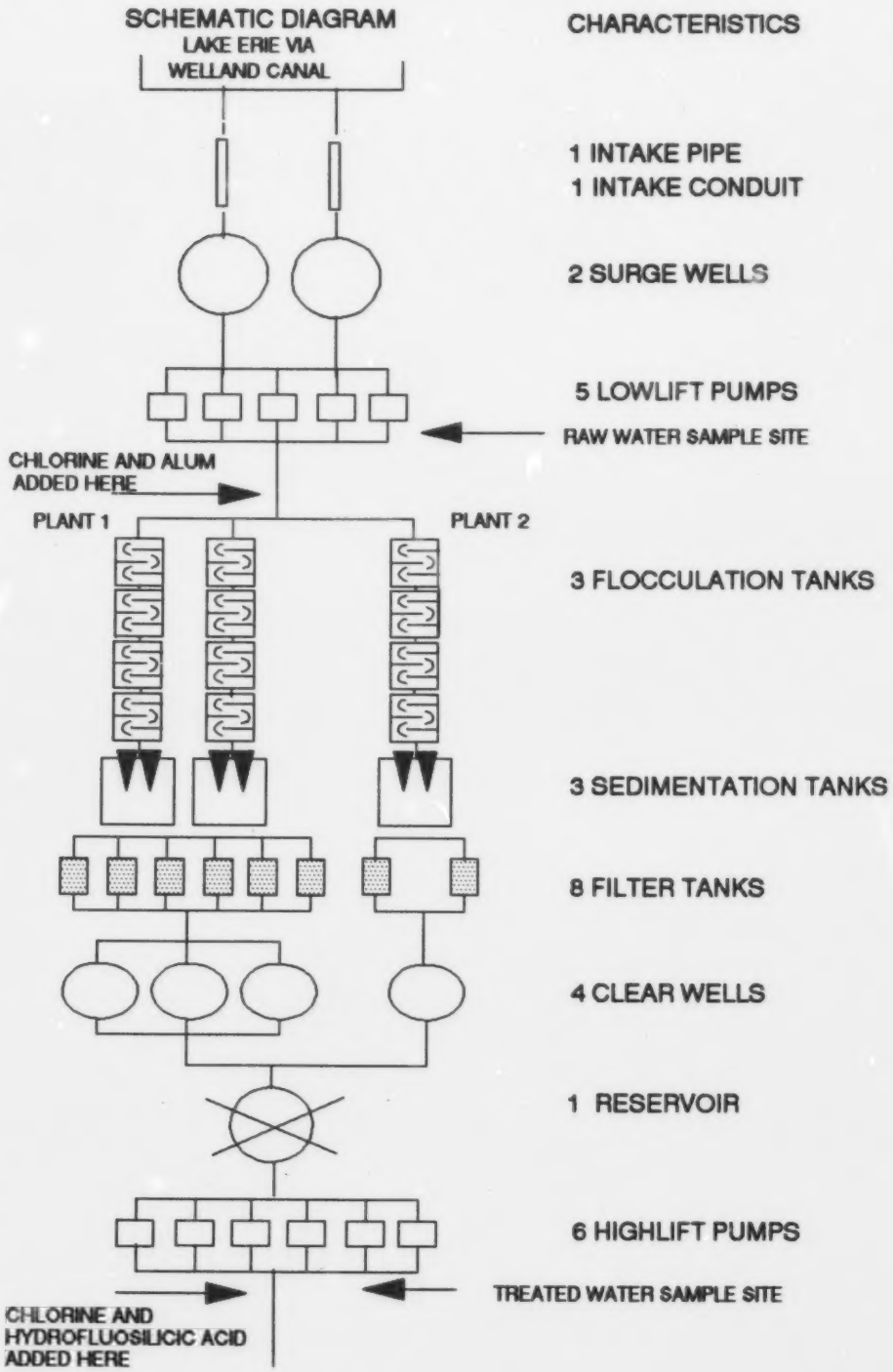

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220002048
PLANT NAME: WELLAND WSS

DISTRICT: WELLAND
REGION: WEST CENTRAL
DISTRICT OFFICER :J. MAYES

UTM #: 176427654761580

PLANT SUPERINTENDENT: T. BURCH

ADDRESS: BOX 292 CROSS ST N
WELLAND, ONTARIO
L3B 5X6
(416-735-7420)

MUNICIPALITY: WELLAND
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	.000	(X 1000 M3)
DESIGN CAPACITY:	109.000	(X 1000 M3/DAY)
RATED CAPACITY:	68.000	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
PELHAM	7,000
THOROLD	200
WELLAND	45,000

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
FREE CHLORINE RESIDUAL	AFTER SETTLING TANKS	CONTINUOUS
	TREATED WATER	CONTINUOUS
TOTAL CHLORINE RESIDUAL	TREATED WATER IN LAB	EVERY 4 HRS
	AFTER SETTLING TANKS	EVERY 4 HRS
TEMPERATURE	RAW WATER	CONTINUOUS
	TREATED WATER	CONTINUOUS
TURBIDITY	TREATED WATER IN LAB	EVERY 4 HOURS
	RAW WATER	CONTINUOUS
	TREATED WATER	CONTINUOUS

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGE (MG/L)			
			PRE CHLORINATION	COAGULATION	FLUORIDATION	POST CHLORINATION
			CHLORINE	ALUM LIQUID	HYDROFLUOSILICIC ACID	CHLORINE
DATE	DELAY * TIME(HRS)	FLOW (1000M3)				
JAN 03	3.00	27.150	.95	7.50	.92	.16
FEB 06	4.00	30.250	1.28	5.23	.98	.16
MAR 06	4.00	---	1.24	5.26	1.28	.11
APR 03	4.00	31.850	1.37	6.76	1.20	.15
MAY 08	4.00	32.600	1.17	8.46	1.05	.25
JUN 05	4.00	---	1.40	7.70	1.11	.29
JUL 03	4.00	47.300	1.45	6.20		.33
AUG 14	4.00	36.900	1.45	7.50	.89	.24
SEP 05	4.00	33.800	1.52	7.20	1.08	.30
OCT 02	4.00	30.400	1.35	6.60	1.10	.18
NOV 06	4.00	28.950	1.06	7.90	1.15	.22
DEC 04	4.00	30.950	1.05	4.60	1.04	.30

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL									
FECAL COLIFORM MF	12	9	0	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	12	4	0	12	0	0
TOTAL COLIFORM MF	12	6	0	.	.	.	.	.	.
T COLIFORM BCKGRD MF	12	12	0	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	36	27	0	12	4	0	12	0	0
CHEMISTRY (FLD)									
FLD CHLORINE (COMB)	.	.	.	12	12	0	24	24	0
FLD CHLORINE FREE	.	.	.	12	12	0	24	24	0
FLD CHLORINE (TOTAL)	.	.	.	12	12	0	24	24	0
FLD PH	12	12	0	12	12	0	24	24	0
FLD TEMPERATURE	12	11	0	12	12	0	24	24	0
FLD TURBIDITY	12	12	0	12	12	0	24	24	0
*TOTAL SCAN CHEMISTRY (FLD)	36	35	0	72	72	0	144	144	0
CHEMISTRY (LAB)									
ALKALINITY	12	12	0	12	12	0	24	24	0
CALCIUM	12	12	0	12	12	0	24	24	0
CYANIDE	12	0	0	12	0	0	.	.	.
CHLORIDE	12	12	0	12	12	0	24	24	0
COLOUR	12	6	6	12	0	12	24	0	23
CONDUCTIVITY	12	12	0	12	12	0	24	24	0
DISS ORG CARBON	12	12	0	12	12	0	24	24	0
FLUORIDE	12	12	0	12	12	0	24	24	0
HARDNESS	12	12	0	12	12	0	24	24	0
IONCAL	12	12	0	12	12	0	24	24	0
LANGELIERS INDEX	12	12	0	12	12	0	24	24	0
MAGNESIUM	12	12	0	12	12	0	24	24	0
SODIUM	12	12	0	12	12	0	24	24	0
AMMONIUM TOTAL	12	5	5	12	1	2	24	2	4
NITRITE	12	7	5	12	2	5	24	2	18
TOTAL NITRATES	12	12	0	12	12	0	24	24	0
NITROGEN TOT KJELD	12	12	0	12	12	0	24	24	0
PH	12	12	0	12	12	0	24	24	0
PHOSPHORUS FIL REACT	12	1	7	12	7	3	.	.	.
PHOSPHORUS TOTAL	12	8	4	12	3	9	.	.	.
SULPHATE	12	12	0	12	12	0	24	24	0
TURBIDITY	12	12	0	12	10	2	24	22	2
*TOTAL SCAN CHEMISTRY (LAB)	264	219	27	264	203	33	456	386	47

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS									
SILVER	12	0	0	12	0	0	24	1	0
ALUMINUM	12	12	0	12	12	0	24	24	0
ARSENIC	12	0	12	12	0	12	24	0	24
BARIUM	12	12	0	12	12	0	24	24	0
BORON	12	12	0	12	12	0	24	24	0
BERYLLIUM	12	0	2	12	0	1	24	0	3
CADMIUM	12	0	0	12	0	1	24	0	7
COBALT	12	0	11	12	0	9	24	0	21
CHROMIUM	12	0	6	12	0	8	24	0	17
COPPER	12	0	12	12	0	12	24	13	11
IRON	12	4	8	12	0	6	24	0	6
MERCURY	12	2	1	12	3	1	.	.	.
MANGANESE	12	12	0	12	11	1	24	24	0
MOLYBDENUM	12	12	0	12	12	0	24	24	0
NICKEL	12	2	9	12	1	9	24	7	16
LEAD	12	0	12	12	0	4	24	24	0
ANTIMONY	12	7	5	12	7	5	24	19	5
SELENIUM	12	0	2	12	0	5	24	0	11
STRONTIUM	12	12	0	12	12	0	24	24	0
TITANIUM	12	5	7	12	3	9	24	6	18
THALLIUM	12	0	0	12	0	0	24	0	0
URANIUM	12	0	12	12	0	12	24	0	24
VANADIUM	12	0	12	12	8	4	24	9	15
ZINC	12	7	5	12	5	7	24	24	0
*TOTAL SCAN METALS	288	99	116	288	98	106	552	247	178
*TOTAL GROUP INORGANIC & PHYSICAL	588	353	143	624	373	139	1152	777	225
CHLOROAROMATICS									
HEXACHLOROBUTADIENE	11	0	0	12	0	0	12	0	0
123 TRICHLOROBENZENE	11	0	0	12	0	0	12	0	0
1234 T-CHLOROBENZENE	11	0	0	12	0	0	12	0	0
1235 T-CHLOROBENZENE	11	0	0	12	0	0	12	0	0
124 TRICHLOROBENZENE	11	0	0	12	0	0	12	0	0
1245 T-CHLOROBENZENE	11	0	0	12	0	0	12	0	0
135 TRICHLOROBENZENE	11	0	0	12	0	0	12	0	0
HCB	11	0	0	12	0	0	12	0	0
HEXACHLOROETHANE	11	0	0	12	0	0	12	0	0
OCTACHLOROSTYRENE	11	0	0	12	0	0	12	0	0
PENTACHLOROBENZENE	11	0	0	12	0	0	12	0	0
236 TRICHLOROTOLUENE	11	0	0	12	0	0	12	0	0
245 TRICHLOROTOLUENE	11	0	0	12	0	0	12	0	0
26A TRICHLOROTOLUENE	11	0	0	12	0	0	12	0	0
*TOTAL SCAN CHLOROAROMATICS	154	0	0	168	0	0	168	0	0
CHLOROPHENOLS									

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0
PAH									
PHENANTHRENE	12	0	0	12	0	0	1	0	0
ANTHRACENE	12	0	0	12	0	0	1	0	0
FLUORANTHENE	12	0	0	12	0	0	1	0	0
PYRENE	12	0	0	12	0	0	1	0	0
BENZO(A)ANTHRACENE	12	0	0	12	0	0	1	0	0
CHRYSENE	12	0	0	12	0	0	1	0	0
DIMETH. BENZ(A)ANTHR	12	0	0	12	0	0	1	0	0
BENZO(E) PYRENE	12	0	0	12	0	0	1	0	0
BENZO(B) FLUORANTHEN	12	0	0	12	0	0	1	0	0
PERYLENE	12	0	0	12	0	0	1	0	0
BENZO(K) FLUORANTHEN	12	0	0	12	0	0	1	0	0
BENZO(A) PYRENE	12	0	0	12	0	0	1	0	0
BENZO(G,H,I) PERYLEN	12	0	0	12	0	0	1	0	0
DIBENZO(A,H) ANTHRAC	12	0	0	12	0	0	1	0	0
INDENO(1,2,3-C,D) PY	12	0	0	12	0	0	1	0	0
BENZO(B) CHRYSENE	12	0	0	12	0	0	1	0	0
CORONENE	12	0	0	12	0	0	1	0	0
*TOTAL SCAN PAH	204	0	0	204	0	0	17	0	0
PESTICIDES & PCB									
ALDRIN	11	0	0	12	0	0	12	0	0
ALPHA BHC	11	0	5	12	0	3	12	0	6
BETA BHC	11	0	0	12	0	0	12	0	0
LINDANE	11	0	0	12	0	0	12	0	1
ALPHA CHLORDANE	11	0	0	12	0	0	12	0	0
GAMMA CHLORDANE	11	0	0	12	0	0	12	0	0
DIELDRIN	11	0	0	12	0	0	12	0	0
METHOXYCHLOR	11	0	0	12	0	0	12	0	0
ENDOSULFAN 1	11	0	0	12	0	0	12	0	0
ENDOSULFAN II	11	0	0	12	0	0	12	0	0
ENDRIN	11	0	0	12	0	0	12	0	0
ENDOSULFAN SULPHATE	11	0	0	12	0	0	12	0	0
HEPTACHLOR EPOXIDE	11	0	0	12	0	0	12	0	0
HEPTACHLOR	11	0	0	12	0	0	12	0	0
MIREX	11	0	0	12	0	0	12	0	0
OXYCHLORDANE	11	0	0	12	0	0	12	0	0
OPDDT	11	0	0	12	0	0	12	0	0
PCB	11	0	0	12	0	0	12	0	0
DDD	11	0	0	12	0	0	12	0	0
PPDDE	11	0	0	12	0	0	12	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	11	0	0	12	0	0	12	0	0
AMETRINE	12	0	0	12	0	0	.	.	.
ATRAZINE	12	0	5	12	0	6	.	.	.
ATRATONE	12	0	0	12	0	0	.	.	.
CYANAZINE (BLADEX)	12	0	0	12	0	0	.	.	.
DESETHYLATRAZINE	12	0	0	12	0	0	.	.	.
D-ETHYL SIMAZINE	11	0	0	11	0	0	.	.	.
PROMETONE	12	0	0	12	0	0	.	.	.
PROPAZINE	12	0	0	12	0	0	.	.	.
PROMETRYNE	12	0	0	12	0	0	.	.	.
METRIBUZIN (SENCOR)	12	0	0	12	0	0	.	.	.
SIMAZINE	12	0	0	12	0	0	.	.	.
ALACHLOR (LASSO)	12	0	0	12	0	0	.	.	.
METOLACHLOR	12	0	0	12	0	0	.	.	.
HEXACLCYCLOPENTADIEN	2	0	0	2	0	0	2	0	0
*TOTAL SCAN PESTICIDES & PCB	388	0	10	409	0	9	254	0	7
PHENOLICS									
PHENOLICS	12	1	5	12	2	7	.	.	.
*TOTAL SCAN PHENOLICS	12	1	5	12	2	7	0	0	0
SPECIFIC PESTICIDES									
TOXAPHENE	11	0	0	12	0	0	12	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.
DICAMBA	2	0	0	2	0	0	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.
ETHION	2	0	0	2	0	0	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.
PHORATE	2	0	0	2	0	0	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.
BENOMYL	0	0	0	0	0	0	.	.	.
BUX	0	0	0	0	0	0	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.
CICP	2	0	0	2	0	0	.	.	.
DIALLATE	2	0	0	2	0	0	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	2	0	0	2	0	0	.	.	.
IPC	2	0	0	2	0	0	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	63	0	0	64	0	0	12	0	0
VOLATILES									
BENZENE	11	0	0	12	0	7	12	1	5
TOLUENE	11	0	1	12	1	6	12	2	5
ETHYLBENZENE	11	0	2	12	0	9	12	0	9
P-XYLENE	11	0	0	12	0	0	12	0	0
M-XYLENE	11	0	0	12	0	5	12	1	2
O-XYLENE	11	0	0	12	0	5	12	1	3
STYRENE	11	0	2	12	0	9	12	0	4
1,1 DICHLOROETHYLENE	11	0	0	12	0	0	12	0	0
METHYLENE CHLORIDE	11	0	0	12	0	0	12	0	0
T1,2DICHLOROETHYLENE	11	0	0	12	0	0	12	0	0
1,1 DICHLOROETHANE	11	0	0	12	0	0	12	0	0
CHLOROFORM	11	0	0	12	12	0	12	12	0
111, TRICHLOROETHANE	11	0	0	12	0	0	12	0	0
1,2 DICHLOROETHANE	11	0	0	12	0	0	12	0	0
CARBON TETRACHLORIDE	11	0	0	12	0	1	12	0	1
1,2 DICHLOROPROPANE	11	0	0	12	0	0	12	0	0
TRICHLOROETHYLENE	11	0	0	12	0	0	12	0	0
DICHLOROBROMOMETHANE	11	0	0	12	12	0	12	12	0
112 TRICHLOROETHANE	11	0	0	12	0	0	12	0	0
CHLORODIBROMOMETHANE	11	0	0	12	12	0	12	12	0
T-CHLOROETHYLENE	11	0	0	12	0	0	12	0	0
BROMOFORM	11	0	0	12	0	12	12	0	12
1122 T-CHLOROETHANE	11	0	0	12	0	0	12	0	0
CHLOROBENZENE	11	0	0	12	0	0	12	0	0
1,4 DICHLOROBENZENE	11	0	0	12	0	0	12	0	0
1,3 DICHLOROBENZENE	11	0	0	12	0	0	12	0	0
1,2 DICHLOROBENZENE	11	0	0	12	0	0	12	0	0
ETHLYENE DIBROMIDE	11	0	0	12	0	0	12	0	0
TOTL TRIHALOMETHANES	11	0	0	12	12	0	12	12	0
*TOTAL SCAN VOLATILES	319	0	5	348	49	54	348	53	41
*TOTAL GROUP ORGANIC	1152	1	20	1217	51	70	799	53	48

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR		Unreliable: Could Not Confirm By Reanalysis
UCS		Unreliable: Contamination Suspected
UIN		Unreliable: Indeterminate Interference
XP		Positive After X Number Of Hours
T#	(T06)	Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
BACTERIOLOGICAL				
FECAL COLIFORM MF (CT/100ML)			**DET'N LIMIT = 0**	**GUIDELINE = 0 (A1)**
JAN	4	.	.	.
FEB	4	.	.	.
MAR	1	.	.	.
APR	0	.	.	.
MAY	4	.	.	.
JUN	21	.	.	.
JUL	4	.	.	.
AUG	4	.	.	.
SEP	BDL	.	.	.
OCT	40	.	.	.
NOV	4	.	.	.
DEC	BDL	.	.	.
STANDRD PLATE CNT MF (COUNTS/ML)			**DET'N LIMIT = 0**	**GUIDELINE = 500/ML (A3)**
JAN	.	1 <=>	.	0 <=>
FEB	.	1 <=>	.	1 <=>
MAR	.	0 <=>	.	0 <=>
APR	.	18	.	1 <=>
MAY	.	1 <=>	.	2 <=>
JUN	.	66	.	1 <=>
JUL	.	122	.	3 <=>
AUG	.	0 <=>	.	5 <=>
SEP	.	17	.	2 <=>
OCT	.	0 <=>	.	1 <=>
NOV	.	5 <=>	.	1 <=>
DEC	.	2 <=>	.	0 <=>
TOTAL COLIFORM MF (CT/100ML)			**DET'N LIMIT = 0**	**GUIDELINE = 5/100ML(A1)**
JAN	140	.	.	.
FEB	550	.	.	.
MAR	20 <=>	.	.	.
APR	20	.	.	.
MAY	3160	.	.	.
JUN	10000	.	.	.
JUL	300 <=>	.	.	.
AUG	20 <=>	.	.	.
SEP	40 <=>	.	.	.
OCT	720	.	.	.
NOV	67 <=>	.	.	.
DEC	60 <=>	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)			**DET'N LIMIT = 0**	**GUIDELINE = N/A**
JAN	1440	.	.	.
FEB	12400	.	.	.
MAR	780	.	.	.
APR	760	.	.	.
MAY	48000 >	.	.	.
JUN	00000	.	.	.
JUL	47000	.	.	.
AUG	17000	.	.	.
SEP	44000	.	.	.
OCT	44000	.	.	.
NOV	483	.	.	.
DEC	600	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHEMISTRY (FLD)				
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
JAN	.	.230	.100	.150
FEB	.	.150	.050	.200
MAR	.	.200	.150	.150
APR	.	.150	.100	.100
MAY	.	.140	.100	.150
JUN	.	.150	.100	.100
JUL	.	.200	.100	.100
AUG	.	.200	.100	.100
SEP	.	.200	.050	.150
OCT	.	.190	.100	.150
NOV	.	.180	.050	.100
DEC	.	.120	.050	.100
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
JAN	.	.250	.150	.350
FEB	.	.450	.250	.350
MAR	.	.450	.200	.400
APR	.	.450	.250	.500
MAY	.	.380	.100	.400
JUN	.	.350	.100	.500
JUL	.	.330	.100	.100
AUG	.	.300	.100	.200
SEP	.	.350	.100	.350
OCT	.	.370	.150	.400
NOV	.	.320	.150	.400
DEC	.	.480	.200	.200
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
JAN	.	.480	.250	.500
FEB	.	.600	.300	.550
MAR	.	.650	.350	.550
APR	.	.600	.350	.600
MAY	.	.520	.200	.550
JUN	.	.500	.200	.600
JUL	.	.530	.200	.200
AUG	.	.500	.200	.300
SEP	.	.550	.150	.500
OCT	.	.560	.250	.550
NOV	.	.500	.200	.500
DEC	.	.600	.250	.300
FLD PH (DIMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)
JAN	7.700	7.500	7.500	7.500
FEB	7.700	7.500	7.500	7.500
MAR	7.700	7.300	7.500	7.350
APR	7.700	7.500	7.500	7.300
MAY	7.600	7.300	7.550	7.500
JUN	7.700	7.200	7.600	7.500
JUL	7.600	7.400	7.500	7.600
AUG	7.780	7.400	7.500	7.300
SEP	7.600	7.200	7.500	7.400
OCT	7.600	7.500	7.400	7.400
NOV	7.800	7.400	7.600	7.500
DEC	7.700	7.500	7.600	7.500

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)
JAN	.000	.100	9.000	3.000
FEB	2.500	2.000	9.000	2.000
MAR	1.900	1.100	9.000	2.000
APR	4.100	3.900	10.000	4.500
MAY	10.800	11.000	15.000	11.000
JUN	15.000	15.000	17.000	15.000
JUL	19.500	19.500	17.000	19.500
AUG	22.800	22.800	23.000	23.000
SEP	22.000	22.000	23.000	22.000
OCT	16.800	16.800	19.500	18.000
NOV	11.700	11.700	17.000	12.500
DEC	8.000	8.100	12.000	8.500
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)
JAN	2.700	.220	.250	.220
FEB	2.200	.250	.430	.350
MAR	1.900	.190	.260	.230
APR	3.800	.310	.300	.260
MAY	2.800	.170	.350	.230
JUN	5.000	.140	.180	.210
JUL	3.000	.130	.200	.190
AUG	2.400	.250	.180	.180
SEP	1.600	.170	.220	.160
OCT	2.700	.150	.140	.130
NOV	2.100	.160	.220	.190
DEC	3.200	.110	.190	.170

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHEMISTRY (LAB)				
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A3)
JAN	109.100	101.700	101.800	101.400
FEB	103.300	95.300	96.200	95.700
MAR	100.500	93.500	93.400	93.600
APR	104.800	98.900	97.000	97.200
MAY	103.100	97.500	96.700	96.800
JUN	98.500	92.600	92.000	91.600
JUL	98.200	93.500	93.000	93.800
AUG	95.100	88.300	87.500	87.400
SEP	94.000	86.800	88.000	86.900
OCT	96.900	89.800	89.800	90.400
NOV	102.200	94.800	95.500	95.800
DEC	102.400	94.600	95.300	95.000
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)
JAN	38.900	39.200	39.500	39.500
FEB	40.400	40.400	40.400	40.000
MAR	40.390	39.820	37.590	37.740
APR	40.200	39.400	39.600	39.600
MAY	39.200	39.900	39.100	38.900
JUN	37.000	37.600	37.500	37.400
JUL	36.000	36.200	36.600	35.400
AUG	36.700	37.200	36.700	35.800
SEP	35.600	34.600	35.800	36.600
OCT	37.800	38.000	37.800	37.000
NOV	37.800	37.300	37.600	37.900
DEC	40.500	40.300	39.800	39.900
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)
JAN	17.300	17.100	18.300	18.600
FEB	18.300	19.200	19.300	19.300
MAR	17.900	18.900	19.000	19.200
APR	16.100	17.400	17.300	17.200
MAY	16.900	17.700	17.900	17.700
JUN	16.600	17.800	18.100	17.900
JUL	15.900	17.500	17.700	17.400
AUG	15.400	16.900	16.600	16.500
SEP	14.900	17.000	17.100	16.700
OCT	15.200	16.500	16.600	16.400
NOV	15.200	16.900	16.400	16.200
DEC	16.100	17.000	17.300	17.100
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)
JAN	2.000 <T	.500 <T	.500 <T	.500 <T
FEB	2.500	1.000 <T	.500 <T	.500 <T
MAR	3.000	1.000 <T	1.000 <T	1.000 <T
APR	3.500	1.500 <T	1.500 <T	1.500 <T
MAY	2.500	1.000 <T	1.000 <T	1.000 <T
JUN	2.000 <T	1.000 <T	1.000 <T	1.000 <T
JUL	1.500 <T	.500 <T	.500 <T	BDL
AUG	1.500 <T	1.000 <T	1.000 <T	.500 <T
SEP	1.500 <T	.500 <T	.500 <T	.500 <T
OCT	2.500	.500 <T	1.000 <T	1.000 <T
NOV	2.000 <T	1.000 <T	1.000 <T	1.000 <T
DEC	2.500	1.500 <T	1.500 <T	1.000 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)
JAN	322	322	326	326
FEB	318	321	322	320
MAR	310	314	315	315
APR	314	323	319	319
MAY	315	319	320	318
JUN	302	307	307	307
JUL	295	298	299	298
AUG	288	292	293	292
SEP	284	287	291	288
OCT	296	300	301	302
NOV	305	307	310	309
DEC	305	309	311	311
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)
JAN	2.000	1.700	1.700	1.600
FEB	1.900	1.700	1.800	1.700
MAR	2.100	1.900	1.900	1.900
APR	2.200	2.000	2.000	2.000
MAY	2.200	2.000	2.200	2.000
JUN	2.800	2.300	2.100	2.100
JUL	2.100	1.800	2.000	2.000
AUG	2.100	1.900	1.900	1.800
SEP	2.000	1.800	1.800	1.700
OCT	2.000	1.800	1.800	1.800
NOV	2.100	2.100	2.100	2.000
DEC	1.900	1.700	1.700	1.800
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)
JAN	.120	1.160	1.120	1.040
FEB	.120	1.120	1.060	.960
MAR	.120	1.160	1.140	1.140
APR	.120	1.140	1.140	1.080
MAY	.100	1.020	1.080	1.100
JUN	.120	1.060	1.080	1.160
JUL	.100	.100	.300	.160
AUG	.120	1.100	1.300	1.200
SEP	.100	1.060	1.220	1.160
OCT	.080	1.100	1.160	1.060
NOV	.160	1.100	1.200	1.200
DEC	.120	1.180	1.240	1.380
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)
JAN	135.200	135.800	135.600	136.600
FEB	139.000	139.000	139.000	138.000
MAR	137.000	136.000	131.000	131.000
APR	138.000	136.000	136.000	136.000
MAY	135.600	136.700	134.900	134.900
JUN	128.800	130.200	130.400	128.800
JUL	128.000	128.000	130.000	127.000
AUG	128.400	128.900	127.400	124.900
SEP	125.000	122.000	125.000	127.000
OCT	131.000	133.000	132.000	130.000
NOV	132.200	131.400	132.200	132.700
DEC	139.500	139.600	138.000	137.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
IONCAL (DMNSLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = N/A**
JAN	3.498	1.021	1.967	1.395
FEB	1.364	3.794	2.656	2.034
MAR	2.943	4.900	.122	.241
APR	.307	.655	.708	.816
MAY	1.468	.661	.450	.219
JUN	.744	1.034	.969	.574
JUL	.631	.744	.870	2.011
AUG	3.380	4.908	4.588	3.517
SEP	1.434	.181	1.055	3.406
OCT	4.050	6.455	5.960	3.954
NOV	.524	.171	.444	.914
DEC	3.296	5.427	4.239	4.662
LANGELIERS INDEX (DMNSLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = N/A**
JAN	.584	.447	.410	.409
FEB	.487	.242	.206	.180
MAR	.476	.298	.213	.205
APR	.572	.427	.361	.362
MAY	.584	.357	.304	.333
JUN	.432	.100	.076	.013
JUL	.511	.441	.423	.383
AUG	.428	.161	.100	.060
SEP	.402	.254	.203	.238
OCT	.486	.434	.391	.395
NOV	.456	.387	.343	.378
DEC	.467	.259	.257	.236
MAGNESIUM (MG/L)			**DET'N LIMIT = 0.1**	**GUIDELINE = 30 (F2)**
JAN	9.250	9.250	9.000	9.200
FEB	9.200	9.300	9.200	9.200
MAR	8.850	9.000	9.050	9.050
APR	9.100	9.100	9.000	9.000
MAY	9.150	9.000	9.050	9.200
JUN	8.850	8.850	8.900	8.600
JUL	9.200	9.200	9.400	9.300
AUG	8.900	8.750	8.650	8.650
SEP	8.800	8.600	8.500	8.600
OCT	8.900	9.200	9.200	9.200
NOV	9.200	9.250	9.300	9.300
DEC	9.300	9.450	9.400	9.100
SODIUM (MG/L)			**DET'N LIMIT = 0.2**	**GUIDELINE = 200 (A4)**
JAN	10.300	9.800	10.200	10.200
FEB	11.000	11.000	10.800	10.800
MAR	11.000	11.500	11.000	10.900
APR	9.200	9.400	9.400	9.400
MAY	9.700	9.700	9.700	10.000
JUN	10.200	10.400	10.200	10.200
JUL	9.400	9.600	9.400	9.200
AUG	9.300	9.600	9.300	9.600
SEP	8.600	8.600	8.800	8.400
OCT	9.400	9.400	9.400	9.200
NOV	9.100	8.800	8.900	8.700
DEC	9.200	9.200	9.000	9.400

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
AMMONIUM TOTAL (MG/L)		**DET'N LIMIT = 0.002**		**GUIDELINE = 0.05 (F2)**
JAN	.006 <T	BDL	BDL	BDL
FEB	.012	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL
APR	.002 <T	BDL	BDL	BDL
MAY	.010	BDL	BDL	BDL
JUN	.010	BDL	BDL	BDL
JUL	.006 <T	BDL	BDL	BDL
AUG	.026	.002 <T	BDL	.006 <T
SEP	.004 <T	BDL	.002 <T	BDL
OCT	.062	.040	.040	.034
NOV	BDL	BDL	.002 <T	BDL
DEC	.002 <T	.004 <T	BDL	.006 <T
NITRITE (MG/L)		**DET'N LIMIT = 0.001**		**GUIDELINE = 1 (A1)**
JAN	.007	.003 <T	.003 <T	.003 <T
FEB	.004 <T	BDL	BDL	.001 <T
MAR	.003 <T	BDL	.001 <T	BDL
APR	.005	.001 <T	.001 <T	.001 <T
MAY	.005	.001 <T	.002 <T	.001 <T
JUN	.004 <T	BDL	.001 <T	BDL
JUL	.018	.010	.014	.003 <T
AUG	.005	.001 <T	.001 <T	.001 <T
SEP	.011	.001 <T	.002 <T	.002 <T
OCT	.003 <T	BDL	.001 <T	BDL
NOV	.004 <T	BDL	.001 <T	.001 <T
DEC	.011	.005	.005	.004 <T
TOTAL NITRATES (MG/L)		**DET'N LIMIT = 0.005**		**GUIDELINE = 10 (A1)**
JAN	.270	.285	.280	.275
FEB	.270	.255	.260	.265
MAR	.290	.300	.305	.300
APR	.465	.485	.455	.450
MAY	.300	.305	.300	.305
JUN	.270	.275	.275	.270
JUL	.280	.280	.275	.265
AUG	.170	.165	.165	.170
SEP	.175	.155	.160	.170
OCT	.190	.175	.180	.180
NOV	.280	.270	.275	.285
DEC	.310	.300	.310	.310
NITROGEN TOT KJELD (MG/L)		**DET'N LIMIT = 0.02**		**GUIDELINE = N/A**
JAN	.260	.180	.190	.170
FEB	.220	.170	.190	.180
MAR	.240	.180	.190	.180
APR	.320	.210	.200	.200
MAY	.290	.200	.200	.290
JUN	.250	.170	.170	.180
JUL	.260	.190	.190	.200
AUG	.220	.180	.190	.190
SEP	.210	.140	.140	.160
OCT	.350	.290	.350	.300
NOV	.230	.170	.180	.170
DEC	.200	.130	.130	.370

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
PH (DIMNSLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = 6.5-8.5(A4)**
JAN	8.400	8.290	8.250	8.250
FEB	8.310	8.100	8.060	8.040
MAR	8.310	8.170	8.110	8.100
APR	8.390	8.280	8.220	8.220
MAY	8.420	8.210	8.170	8.200
JUN	8.310	8.000	7.980	7.920
JUL	8.400	8.350	8.330	8.300
AUG	8.320	8.080	8.030	8.000
SEP	8.310	8.210	8.140	8.170
OCT	8.360	8.340	8.300	8.310
NOV	8.310	8.280	8.230	8.260
DEC	8.290	8.120	8.120	8.100
PHOSPHORUS FIL REACT (MG/L)			**DET'N LIMIT = 0.0005**	**GUIDELINE = N/A**
JAN	BDL	.002	.	.
FEB	.002 <T	.003	.	.
MAR	.001 <T	.003	.	.
APR	.001 <T	.002	.	.
MAY	BDL	.001 <T	.	.
JUN	.002 <T	.002	.	.
JUL	BDL	BDL	.	.
AUG	.000 <T	.003	.	.
SEP	BDL	BDL	.	.
OCT	.002	.002	.	.
NOV	.002 <T	.001 <T	.	.
DEC	.000 <T	.000 <T	.	.
PHOSPHORUS TOTAL (MG/L)			**DET'N LIMIT = 0.002**	**GUIDELINE = .40 (F2)**
JAN	.010	.005 <T	.	.
FEB	.004 <T	.025	.	.
MAR	.008 <T	.005 <T	.	.
APR	.020	.010	.	.
MAY	.011	.006 <T	.	.
JUN	.012	.003 <T	.	.
JUL	.010	.002 <T	.	.
AUG	.008 <T	.007 <T	.	.
SEP	.008 <T	.006 <T	.	.
OCT	.014	.002 <T	.	.
NOV	.076	.067	.	.
DEC	.013	.002 <T	.	.
SULPHATE (MG/L)			**DET'N LIMIT = .200**	**GUIDELINE = 500 (A3)**
JAN	27.430	30.680	30.990	30.920
FEB	29.150	32.430	32.300	32.750
MAR	28.540	31.350	32.170	31.700
APR	27.900	30.770	30.890	30.690
MAY	29.620	31.790	32.260	32.150
JUN	28.030	31.340	31.150	30.980
JUL	26.330	29.730	28.980	29.050
AUG	25.170	28.810	28.280	28.440
SEP	25.030	28.180	28.110	27.990
OCT	25.600	29.040	29.090	29.190
NOV	25.470	29.690	29.930	29.490
DEC	26.920	30.370	29.160	29.050

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
TURBIDITY (FTU)			DET'N LIMIT = 0.05		GUIDELINE = 1 (A1)
JAN	2.700	.180	.240	.300	
FEB	2.600	.280	.850	.270	
MAR	2.600	.440	.570	.620	
APR	5.800	.440	.490	.290	
MAY	3.600	.370	.250	.310	
JUN	6.400	.270	.350	.410	
JUL	4.700	.320	.270	.380	
AUG	2.300	.300	.300	.190	
SEP	2.000	.100 <T	.360	.220	
OCT	3.900	.210 <T	.230 <T	.240 <T	
NOV	2.700	.360	.450	.300	
DEC	3.900	.390	.430	.400	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
METALS				
SILVER (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A1)
JAN	BDL	BDL	BDL	BDL
FEB	BDL	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	.730
DEC	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)
JAN	28.000	52.000	50.000	46.000
FEB	38.000	61.000	57.000	54.000
MAR	35.000	82.000	67.000	72.000
APR	61.000	120.000	90.000	97.000
MAY	50.000	170.000	130.000	150.000
JUN	58.000	170.000	110.000	150.000
JUL	40.000	230.000	190.000	230.000
AUG	40.000	280.000	160.000	220.000
SEP	25.000	220.000	170.000	200.000
OCT	49.000	160.000	110.000	140.000
NOV	31.000	110.000	90.000	140.000
DEC	51.000	80.000	72.000	73.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)
JAN	.670 <T	.590 <T	.540 <T	.690 <T
FEB	.680 <T	.820 <T	1.000 <T	.770 <T
MAR	.530 <T	.850 <T	.820 <T	.680 <T
APR	.690 <T	.590 <T	.690 <T	.670 <T
MAY	.780 <T	.930 <T	.940 <T	1.000 <T
JUN	.350 <T	.530 <T	.390 <T	.370 <T
JUL	.420 <T	.430 <T	.430 <T	.630 <T
AUG	.720 <T	.910 <T	.790 <T	.920 <T
SEP	.450 <T	.510 <T	.790 <T	.660 <T
OCT	.790 <T	.940 <T	.870 <T	.910 <T
NOV	.670 <T	.780 <T	.500 <T	.660 <T
DEC	.720 <T	.860 <T	.490 <T	.710 <T
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)
JAN	23.000	22.000	23.000	22.000
FEB	23.000	22.000	24.000	23.000
MAR	21.000	20.000	21.000	20.000
APR	21.000	21.000	21.000	20.000
MAY	22.000	21.000	22.000	21.000
JUN	22.000	21.000	22.000	22.000
JUL	21.000	21.000	20.000	20.000
AUG	22.000	22.000	22.000	22.000
SEP	21.000	22.000	22.000	21.000
OCT	25.000	24.000	24.000	25.000
NOV	20.000	20.000	22.000	20.000
DEC	19.000	21.000	21.000	21.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
BORON (UG/L)			**DET'N LIMIT = 2.00**	**GUIDELINE = 5000 (A1)**
JAN	24.000	24.000	25.000	24.000
FEB	26.000	26.000	27.000	26.000
MAR	22.000	23.000	36.000	26.000
APR	27.000	27.000	27.000	27.000
MAY	37.000	36.000	74.000	39.000
JUN	63.000	61.000	65.000	65.000
JUL	24.000	24.000	24.000	24.000
AUG	37.000	31.000	30.000	37.000
SEP	32.000	31.000	30.000	31.000
OCT	26.000	27.000	27.000	27.000
NOV	25.000	23.000	25.000	25.000
DEC	22.000	23.000	24.000	23.000
BERYLLIUM (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 6800 (D4)**
JAN	BDL	BDL	BDL	BDL
FEB	.060 <T	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL
MAY	BDL	BDL	.090 <T	BDL
JUN	.060 <T	.080 <T	.060 <T	.080 <T
JUL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL
CADMIUM (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 5 (A1)**
JAN	BDL	BDL	.080 <T	BDL
FEB	BDL	BDL	BDL	BDL
MAR	BDL	.060 <T	BDL	BDL
APR	BDL	BDL	.130 <T	BDL
MAY	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL
JUL	BDL	BDL	.130 <T	BDL
AUG	BDL	BDL	.090 <T	BDL
SEP	BDL	BDL	.140 <T	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	.070 <T	BDL
DEC	BDL	BDL	.110 <T	BDL
COBALT (UG/L)			**DET'N LIMIT = 0.02**	**GUIDELINE = N/A**
JAN	.110 <T	.130 <T	.150 <T	.210 <T
FEB	.090 <T	.050 <T	.080 <T	.060 <T
MAR	.250 <T	.140 <T	.090 <T	.180 <T
APR	.300 <T	.190 <T	.130 <T	.120 <T
MAY	.230 <T	.190 <T	.120 <T	.240 <T
JUN	.060 <T	BDL	.040 <T	BDL
JUL	.160 <T	.180 <T	.100 <T	.140 <T
AUG	BDL	BDL	BDL	BDL
SEP	.060 <T	BDL	.060 <T	.030 <T
OCT	.110 <T	.090 <T	.080 <T	.080 <T
NOV	.030 <T	.030 <T	.040 <T	.040 <T
DEC	.090 <T	.090 <T	.070 <T	.080 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHROMIUM (UG/L)			**DET'N LIMIT = 0.50**	**GUIDELINE = 50 (A1)**
JAN	BDL	BDL	BDL	BDL
FEB	BDL	.510 <T	BDL	BDL
MAR	BDL	BDL	2.600 <T	.900 <T
APR	BDL	.660 <T	BDL	.530 <T
MAY	1.300 <T	1.400 <T	3.900 <T	1.700 <T
JUN	2.600 <T	2.700 <T	2.900 <T	2.800 <T
JUL	1.600 <T	1.700 <T	1.800 <T	1.900 <T
AUG	3.000 <T	1.600 <T	1.300 <T	2.900 <T
SEP	2.000 <T	2.100 <T	1.900 <T	2.100 <T
OCT	BDL	BDL	BDL	BDL
NOV	1.100 <T	BDL	1.300 <T	1.400 <T
DEC	BDL	.800 <T	.910 <T	.850 <T
COPPER (UG/L)			**DET'N LIMIT = 0.50**	**GUIDELINE = 1000 (A3)**
JAN	1.200 <T	1.100 <T	76.000	2.500 <T
FEB	1.100 <T	.980 <T	82.000	1.900 <T
MAR	1.100 <T	.880 <T	56.000	2.500 <T
APR	1.300 <T	.990 <T	52.000	2.200 <T
MAY	1.300 <T	1.000 <T	80.000	3.100 <T
JUN	1.400 <T	1.100 <T	48.000	2.900 <T
JUL	1.300 <T	1.100 <T	53.000	3.400 <T
AUG	1.500 <T	.930 <T	60.000	3.100 <T
SEP	1.300 <T	.940 <T	170.000	6.500
OCT	1.200 <T	.990 <T	81.000	3.200 <T
NOV	1.000 <T	.830 <T	73.000	2.500 <T
DEC	1.200 <T	1.100 <T	78.000	2.500 <T
IRON (UG/L)			**DET'N LIMIT = 6.00**	**GUIDELINE = 300 (A3)**
JAN	45.000 <T	BDL	BDL	BDL
FEB	54.000 <T	6.500 <T	BDL	BDL
MAR	38.000 <T	9.100 <T	6.500 <T	BDL
APR	75.000	6.800 <T	6.400 <T	BDL
MAY	56.000 <T	BDL	16.000 <T	6.100 <T
JUN	78.000	13.000 <T	BDL	BDL
JUL	66.000	BDL	BDL	BDL
AUG	41.000 <T	10.000 <T	BDL	BDL
SEP	35.000 <T	BDL	BDL	8.900 <T
OCT	71.000	BDL	BDL	BDL
NOV	48.000 <T	BDL	BDL	BDL
DEC	58.000 <T	6.200 <T	6.400 <T	BDL
MERCURY (UG/L)			**DET'N LIMIT = 0.02**	**GUIDELINE = 1 (A1)**
JAN	.140	.180	.	.
FEB	.170	.200	.	.
MAR	BDL	BDL	.	.
APR	BDL	BDL	.	.
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	BDL	.030 <T	.	.
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	BDL	.110	.	.
NOV	BDL	BDL	.	.
DEC	.040 <T	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)
JAN	3.400	.510	1.000	.760
FEB	3.700	.710	.950	.650
MAR	2.800	.770	1.100	.820
APR	4.700	.860	1.200	.900
MAY	5.400	.980	1.500	1.200
JUN	6.900	.990	1.600	1.300
JUL	4.800	.620	1.300	.920
AUG	3.500	.520	1.600	1.100
SEP	3.300	.630	.990	.780
OCT	4.200	.520	1.300	.810
NOV	2.500	.350 <T	1.000	.680
DEC	2.400	.620	.860	.550
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A
JAN	1.200	1.300	1.300	1.300
FEB	1.100	1.300	1.300	1.400
MAR	1.000	1.200	1.100	1.100
APR	.950	1.100	1.100	1.200
MAY	1.100	1.200	1.300	1.300
JUN	.990	1.100	1.200	1.100
JUL	1.100	1.200	1.300	1.200
AUG	1.200	1.200	1.300	1.100
SEP	1.200	1.200	1.200	1.300
OCT	1.300	1.300	1.300	1.400
NOV	1.100	1.200	1.200	1.200
DEC	1.600	1.200	1.200	1.200
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)
JAN	2.000 <T	1.900 <T	2.800	1.600 <T
FEB	1.800 <T	.910 <T	1.400 <T	.700 <T
MAR	1.600 <T	1.400 <T	2.900	1.500 <T
APR	2.200	1.800 <T	2.600	1.700 <T
MAY	1.100 <T	1.300 <T	1.600 <T	1.100 <T
JUN	.450 <T	.610 <T	1.800 <T	.320 <T
JUL	1.200 <T	1.300 <T	3.700	1.200 <T
AUG	BDL	BDL	1.800 <T	BDL
SEP	.230 <T	BDL	11.000	.460 <T
OCT	2.600	2.400	3.200	2.300
NOV	.700 <T	.360 <T	1.200 <T	.340 <T
DEC	1.200 <T	1.000 <T	1.800 <T	1.100 <T
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)
JAN	.120 <T	BDL	11.000	1.200
FEB	.160 <T	BDL	12.000	1.200
MAR	.130 <T	.220 <T	11.000	1.300
APR	.270 <T	BDL	12.000	1.400
MAY	.220 <T	.100 <T	15.000	2.000
JUN	.200 <T	BDL	14.000	2.300
JUL	.140 <T	BDL	13.000	2.400
AUG	.180 <T	BDL	16.000	3.300
SEP	.150 <T	BDL	38.000	3.400
OCT	.200 <T	.070 <T	22.000	3.900
NOV	.090 <T	BDL	18.000	2.400
DEC	.090 <T	.090 <T	18.000	1.900

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
ANTIMONY (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 146 (D4)**
JAN	.370 <T	.550	.560	.580
FEB	.460 <T	.500 <T	.660	.530
MAR	.530	.720	.660	.600
APR	.550	.380 <T	.640	.450 <T
MAY	.520	.550	.580	.790
JUN	.400 <T	.460 <T	.500 <T	.400 <T
JUL	.680	.510	.610	.570
AUG	.570	.660	.640	.530
SEP	.510	.400 <T	.670	.430 <T
OCT	.540	.560	.520	.540
NOV	.430 <T	.380 <T	.580	.430 <T
DEC	.490 <T	.610	.660	.610
SELENIUM (UG/L)			**DET'N LIMIT = 1.00**	**GUIDELINE = 10 (A1)**
JAN	BDL	BDL	BDL	BDL
FEB	BDL	1.100 <T	BDL	BDL
MAR	BDL	1.400 <T	1.500 <T	BDL
APR	1.100 <T	BDL	BDL	1.100 <T
MAY	BDL	2.100 <T	1.300 <T	1.700 <T
JUN	1.200 <T	BDL	2.900 <T	1.500 <T
JUL	BDL	BDL	1.900 <T	BDL
AUG	BDL	1.200 <T	1.800 <T	1.600 <T
SEP	BDL	1.200 <T	1.300 <T	1.600 <T
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL
STRONTIUM (UG/L)			**DET'N LIMIT = 0.10**	**GUIDELINE = N/A**
JAN	190.000	190.000	190.000	190.000
FEB	210.000	210.000	220.000	210.000
MAR	190.000	190.000	190.000	190.000
APR	210.000	210.000	200.000	200.000
MAY	210.000	210.000	210.000	210.000
JUN	200.000	190.000	200.000	190.000
JUL	170.000	170.000	170.000	170.000
AUG	180.000	180.000	180.000	180.000
SEP	170.000	170.000	170.000	170.000
OCT	200.000	200.000	200.000	200.000
NOV	170.000	170.000	170.000	170.000
DEC	170.000	180.000	180.000	180.000
TITANIUM (UG/L)			**DET'N LIMIT = 0.50**	**GUIDELINE = N/A**
JAN	4.900 <T	4.200 <T	4.500 <T	4.300 <T
FEB	8.800	9.200	9.000	8.900
MAR	3.900 <T	4.000 <T	4.200 <T	4.200 <T
APR	5.600	4.600 <T	4.400 <T	4.400 <T
MAY	8.800	7.700	8.200	7.800
JUN	7.700	7.200	6.000	6.600
JUL	5.600	3.300 <T	3.700 <T	3.700 <T
AUG	4.600 <T	3.700 <T	4.500 <T	3.900 <T
SEP	4.100 <T	4.200 <T	4.200 <T	3.900 <T
OCT	2.600 <T	1.700 <T	1.700 <T	1.700 <T
NOV	3.000 <T	2.800 <T	2.800 <T	2.800 <T
DEC	4.600 <T	3.200 <T	3.100 <T	3.400 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)
JAN	.360 <T	.360 <T	.320 <T	.300 <T
FEB	.350 <T	.420 <T	.330 <T	.370 <T
MAR	.360 <T	.340 <T	.330 <T	.330 <T
APR	.320 <T	.340 <T	.360 <T	.340 <T
MAY	.380 <T	.350 <T	.350 <T	.350 <T
JUN	.330 <T	.350 <T	.290 <T	.350 <T
JUL	.260 <T	.300 <T	.290 <T	.300 <T
AUG	.340 <T	.320 <T	.310 <T	.350 <T
SEP	.320 <T	.320 <T	.240 <T	.300 <T
OCT	.400 <T	.350 <T	.290 <T	.340 <T
NOV	.360 <T	.310 <T	.270 <T	.310 <T
DEC	.340 <T	.330 <T	.270 <T	.290 <T
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A
JAN	.300 <T	.510	.480 <T	.490 <T
FEB	.240 <T	.580	.600	.590
MAR	.210 <T	.520	.450 <T	.490 <T
APR	.300 <T	.580	.580	.630
MAY	.280 <T	.530	.550	.490 <T
JUN	.110 <T	.390 <T	.310 <T	.410 <T
JUL	.270 <T	.520	.470 <T	.540
AUG	.260 <T	.530	.510	.550
SEP	.190 <T	.380 <T	.350 <T	.420 <T
OCT	.380 <T	.520	.470 <T	.540
NOV	.190 <T	.400 <T	.390 <T	.370 <T
DEC	.200 <T	.340 <T	.340 <T	.330 <T
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)
JAN	1.800 <T	1.200 <T	80.000	4.100
FEB	2.500	2.200	80.000	3.600
MAR	2.800	2.100	79.000	4.400
APR	3.200	1.300 <T	62.000	14.000
MAY	2.000 <T	1.600 <T	60.000	6.300
JUN	2.400	2.100	75.000	9.700
JUL	2.300	1.900 <T	48.000	9.400
AUG	1.700 <T	1.900 <T	74.000	8.600
SEP	1.300 <T	1.200 <T	120.000	7.600
OCT	1.500 <T	.970 <T	160.000	12.000
NOV	2.400	2.200	110.000	13.000
DEC	2.800	2.400	110.000	7.900

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
PESTICIDES & PCB				
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)
JAN	1.000 <T	1.000 <T	.	1.000 <T
FEB	1.000 <T	BDL	.	2.000 <T
MAR	ILA	BDL	.	BDL
APR	BDL	BDL	.	BDL
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	2.000 <T
JUL	1.000 <T	2.000 <T	.	1.000 <T
AUG	1.000 <T	BDL	.	1.000 <T
SEP	1.000 <T	1.000 <T	.	1.000 <T
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL
LINDANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 4000 (A1)
JAN	BDL	BDL	.	BDL
FEB	BDL	BDL	.	BDL
MAR	ILA	BDL	.	BDL
APR	BDL	BDL	.	BDL
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	1.000 <T
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	BDL
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL
ATRAZINE (NG/L)			DET'N LIMIT = 50	GUIDELINE = 60000 (A2)
JAN	BDL	BDL	.	.
FEB	BDL	BDL	.	.
MAR	100.000 <T	110.000 <T	.	.
APR	140.000 <T	70.000 <T	.	.
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	110.000 <T	150.000 <T	.	.
AUG	BDL	290.000 <T	.	.
SEP	120.000 <T	110.000 <T	.	.
OCT	BDL	BDL	.	.
NOV	170.000 <T	160.000 <T	.	.
DEC	BDL	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
PHENOLICS (UG/L PHENOLICS)			DET'N LIMIT = .2	GUIDELINE = 2	(A4)
JAN	.600 <T	1.400	.	.	
FEB	.400 <T	.600 <T	.	.	
MAR	.600 <T	.600 <T	.	.	
APR	1.000	1.000	.	.	
MAY	.400 <T	BDL	.	.	
JUN	BDL	BDL	.	.	
JUL	BDL	.400 <T	.	.	
AUG	BDL	.600 <T	.	.	
SEP	BDL	.400 <T	.	.	
OCT	.600 <T	.800 <T	.	.	
NOV	BDL	BDL	.	.	
DEC	BDL	.600 <T	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
VOLATILES				
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
JAN	BDL	BDL	.	BDL
FEB	BDL	BDL	.	BDL
MAR	BDL	.100 <T	.	BDL
APR	BDL	.100 <T	.	.100 <T
MAY	IU	.200 <T	.	.150 <T
JUN	BDL	.150 <T	.	.050 <T
JUL	BDL	.200 <T	.	.700
AUG	BDL	.450 <T	.	.100 <T
SEP	BDL	.300 <T	.	.300 <T
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)
JAN	BDL	BDL	.	BDL
FEB	BDL	BDL	.	BDL
MAR	BDL	BDL	.	BDL
APR	BDL	.100 <T	.	.050 <T
MAY	IU	.400 <T	.	.250 <T
JUN	BDL	.100 <T	.	.050 <T
JUL	BDL	.300 <T	.	1.600
AUG	BDL	.500 <T	.	.050 <T
SEP	BDL	.600	.	.500
OCT	BDL	BDL	.	BDL
NOV	.050 <T	.200 <T	.	.050 <T
DEC	BDL	BDL	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)
JAN	BDL	BDL	.	BDL
FEB	BDL	BDL	.	BDL
MAR	BDL	.250 <T	.	.150 <T
APR	BDL	.200 <T	.	.350 <T
MAY	IU	.150 <T	.	.200 <T
JUN	BDL	.200 <T	.	.050 <T
JUL	BDL	.150 <T	.	.300 <T
AUG	BDL	.250 <T	.	.150 <T
SEP	BDL	.100 <T	.	.100 <T
OCT	BDL	BDL	.	.050 <T
NOV	.100 <T	.100 <T	.	.100 <T
DEC	.100 <T	.100 <T	.	BDL
M-XYLENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)
JAN	BDL	BDL	.	BDL
FEB	BDL	BDL	.	BDL
MAR	BDL	BDL	.	BDL
APR	BDL	BDL	.	BDL
MAY	IU	.300 <T	.	.300 <T
JUN	BDL	.100 <T	.	BDL
JUL	BDL	.300 <T	.	1.300
AUG	BDL	.800 <T	.	BDL
SEP	BDL	.500 <T	.	.500 <T
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
O-XYLENE (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 300 (A3*)**
JAN	BDL	BDL	.	BDL
FEB	BDL	BDL	.	BDL
MAR	BDL	BDL	.	BDL
APR	BDL	BDL	.	BDL
MAY	IU	.200 <T	.	.150 <T
JUN	BDL	.050 <T	.	BDL
JUL	BDL	.150 <T	.	.650
AUG	BDL	.350 <T	.	.050 <T
SEP	BDL	.300 <T	.	.250 <T
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL
STYRENE (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 100 (D1)**
JAN	BDL	.100 <T	.	BDL
FEB	BDL	.050 <T	.	BDL
MAR	BDL	.200 <T	.	.100 <T
APR	BDL	.100 <T	.	.200 <T
MAY	IU	.150 <T	.	.100 <T
JUN	BDL	.200 <T	.	BDL
JUL	BDL	.100 <T	.	BDL
AUG	BDL	.150 <T	.	.250 <T
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	.150 <T	BDL	.	BDL
DEC	.200 <T	.050 <T	.	BDL
CHLOROFORM (UG/L)			**DET'N LIMIT = 0.10**	**GUIDELINE = 350 (A1+)**
JAN	BDL	14.400	.	13.400
FEB	BDL	14.500	.	14.900
MAR	BDL	21.900	.	22.300
APR	BDL	33.800	.	34.200
MAY	IU	27.100	.	27.800
JUN	BDL	21.700	.	24.500
JUL	BDL	21.900	.	19.700
AUG	BDL	20.100	.	15.500
SEP	BDL	20.100	.	18.700
OCT	BDL	19.000	.	19.700
NOV	BDL	14.000	.	14.200
DEC	BDL	14.100	.	13.400
CARBON TETRACHLORIDE (UG/L)			**DET'N LIMIT = 0.20**	**GUIDELINE = 5 (A1)**
JAN	BDL	BDL	.	BDL
FEB	BDL	BDL	.	BDL
MAR	BDL	BDL	.	BDL
APR	BDL	BDL	.	BDL
MAY	IU	BDL	.	BDL
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	BDL
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	.200 <T	.	.200 <T
DEC	BDL	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WELLAND WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
DICHLOROBROMOMETHANE (UG/L)		**DET'N LIMIT = 0.05**		**GUIDELINE = 350 (A1+)**
JAN	BDL	10.800	.	10.400
FEB	BDL	10.700	.	11.100
MAR	BDL	13.200	.	13.600
APR	BDL	15.500	.	16.150
MAY	IU	12.350	.	13.350
JUN	BDL	11.550	.	12.600
JUL	BDL	12.200	.	11.550
AUG	BDL	12.450	.	10.000
SEP	BDL	12.750	.	12.050
OCT	BDL	11.950	.	11.750
NOV	BDL	9.200	.	9.700
DEC	BDL	10.350	.	9.850
CHLORODIBROMOMETHANE (UG/L)		**DET'N LIMIT = 0.10**		**GUIDELINE = 350 (A1+)**
JAN	BDL	4.100	.	5.200
FEB	BDL	5.100	.	5.200
MAR	BDL	4.500	.	4.600
APR	BDL	4.400	.	4.800
MAY	IU	4.300	.	4.700
JUN	BDL	4.600	.	4.700
JUL	BDL	5.300	.	5.300
AUG	BDL	7.100	.	5.100
SEP	BDL	5.900	.	5.600
OCT	BDL	5.400	.	5.300
NOV	BDL	4.200	.	4.300
DEC	BDL	4.400	.	4.100
BROMOFORM (UG/L)		**DET'N LIMIT = 0.20**		**GUIDELINE = 350 (A1+)**
JAN	BDL	.400 <T	.	.600 <T
FEB	BDL	.400 <T	.	.400 <T
MAR	BDL	.200 <T	.	.200 <T
APR	BDL	.200 <T	.	.200 <T
MAY	IU	.200 <T	.	.400 <T
JUN	BDL	.400 <T	.	.400 <T
JUL	BDL	.600 <T	.	.400 <T
AUG	BDL	.600 <T	.	.600 <T
SEP	BDL	.600 <T	.	.600 <T
OCT	BDL	.600 <T	.	.600 <T
NOV	BDL	.400 <T	.	.400 <T
DEC	BDL	.400 <T	.	.400 <T
TOTL TRIHALOMETHANES (UG/L)		**DET'N LIMIT = 0.50**		**GUIDELINE = 350 (A1)**
JAN	BDL	29.800	.	29.600
FEB	BDL	30.700	.	31.700
MAR	BDL	39.850	.	40.800
APR	BDL	53.900	.	55.350
MAY	IU	43.900	.	46.200
JUN	BDL	38.250	.	42.200
JUL	BDL	40.000	.	36.950
AUG	BDL	40.250	.	31.200
SEP	BDL	39.500	.	37.000
OCT	BDL	36.900	.	37.300
NOV	BDL	27.900	.	28.650
DEC	BDL	29.300	.	27.750

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
BACTERIOLOGICAL				
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0	(A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML	(A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A	
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML	(A1)
CHEMISTRY (FLD)				
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD PH	DMNSLESS	N/A	6.5-8.5	(A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0	(A3)
FIELD TURBIDITY	FTU	N/A	1.0	(A1)
CHEMISTRY (LAB)				
ALKALINITY	MG/L	0.2	30-500	(A3)
AMMONIUM TOTAL	MG/L	0.002	0.05	(F2)
CALCIUM	MG/L	0.2	100	(F2)
CHLORIDE	MG/L	0.2	250	(A3)
COLOUR	TCU	0.5	5.0	(A3)
CONDUCTIVITY	UMHO/CM	1.0	400	(F2)
CYANIDE	MG/L	0.001	0.2	(A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0	(A3)
FLUORIDE	MG/L	0.01	2.4	(A1)
HARDNESS	MG/L	0.5	80-100	(A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A	
MAGNESIUM	MG/L	0.1	30.0	(F2)
NITRITE	MG/L	0.001	1.0	(A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A	
PH	DMNSLESS	N/A	6.5-8.5	(A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A	
PHOSPHORUS TOTAL	MG/L	0.002	0.4	(F2)
SODIUM	MG/L	0.2	200	(A4)
SULPHATE	MG/L	0.2	500	(A3)
TOTAL NITRATES	MG/L	0.005	10.0	(A1)
TURBIDITY	FTU	0.05	1.0	(A1)
CHLOROAROMATICS				
123 TRICHLOROBENZENE	NG/L	5.0	N/A	
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A	
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A	
124 TRICHLOROBENZENE	NG/L	5.0	10000	(I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000	(D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A	
236 TRICHLOROTOLUENE	NG/L	5.0	N/A	
245 TRICHLOROTOLUENE	NG/L	5.0	N/A	
26A TRICHLOROTOLUENE	NG/L	5.0	N/A	
HEXACHLOROBENZENE	NG/L	1.0	10	(C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450	(D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000	(D4)
HEXACHLOROETHANE	NG/L	1.0	1900	(D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A	
PENTACHLOROBENZENE	NG/L	1.0	74000	(D4)
CHLOROPHENOLS				
234 TRICHLOROPHENOL	NG/L	100.0	N/A	
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A	
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A	

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the

treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.